POPULAR MECHANICS

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Fighting Fires From Lofty Ladders

LATEST AMERICAN LADDER.

DUBLIN, IRELAND, FIRE LADDER.

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THE FIRST AND THE LATEST FIRE ENGINES.

Half Century's Progress Has Brought About Wonderful Improvements—The Aerial Truck.

"I drove the team that hauled the first steam fire engine ever built; drove it to the first fire on which streams driven by steam power ever played. It was in Cincinnati. The 'Uncle Joe Ross,' the first fire engine, had just been built by Miles Greenwood, and all the town was anxious to see what it would do. My brother and I were on our way to church Sunday morning. The fire bells started their clanging and we headed for Greenwood's shop. There the engine stood, steam up, four large horses hitched to it, a crowd looking at it and Greenwood as mad as the devil because he couldn't get a man to drive the horses.

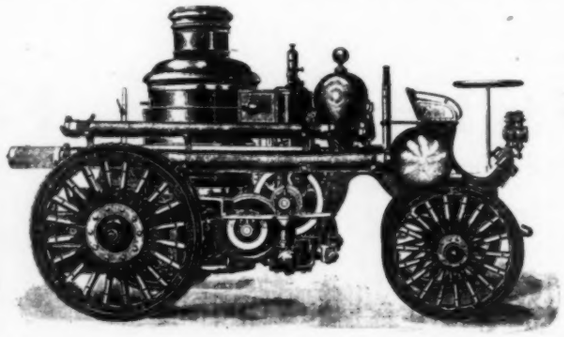
"You see all the firemen were opposed to this new invention because they believed it would put thm out of business and spoil their fun and nobody wanted to be stoned by them. They had threateed all kinds of vengeance. Besides, the horses were kicking about furiously. I jumped on the back of a wheel horse, seized the reins and out we went kiting. When we got to the conflagration we took suction from the canal, played two streams on the burning building and put the fire out. That was the biggest crowd I ever saw in my life and people yelled and shouted, while the firemen, standing around the piano machines (the hand engines), jeered and groaned. The city hired me to drive the four horses and paid me $75 a month. The engine was a great long, wide affair, with a heavy boiler and ran on three wheels, two behind and one in front to guide it by.

"After two weeks a fellow offered to do my work for $50 a month and they turned me off and hired him. The second fire he drove to he was run over and killed."

Thus spoke an Iowan when telling of his experiences in Cincinnati in the early days.

The "Uncle Joe Ross" was sure enough the first fire engine ever built. It went into service April 1, 1853. The half-century anniversary of the event will probably be observed in Cincinnati on April 1, 1903.

Miles Greenwood, the hero of the first fire engine, had the machine built at the shops of A. B. & A. E. Latta. The engine was named for Alderman Joe Ross of Cincinnati, who introduced the order for its construction. Greenwood was afterward made chief of the fire department with a salary of $1,000 per



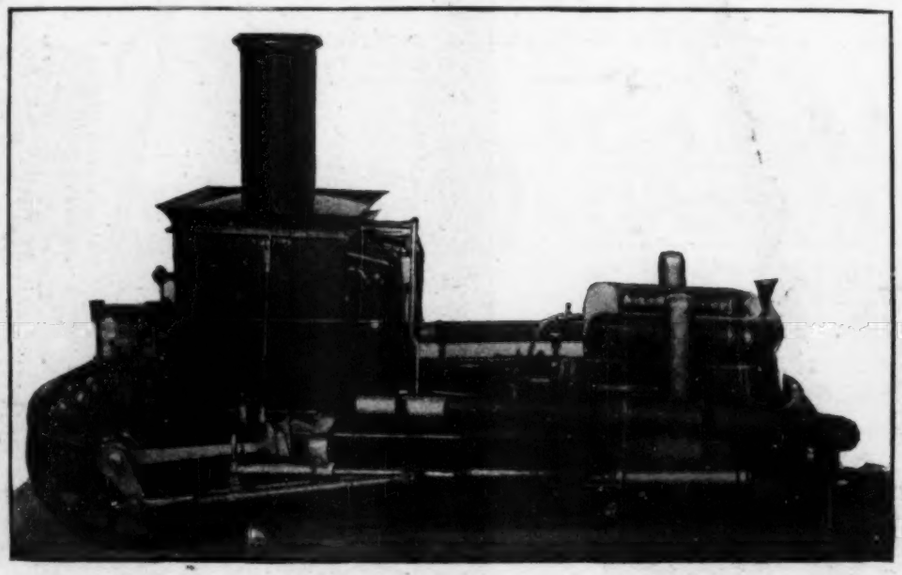
BOSTON SELF-PROPELLER.

annum. He hired a man to look after his other business and paid him a salary of $1,500 a year. Besides he presented his first year's salary to the Mechanic's Institute. An eastern committee visited Cincinnati to inspect the engine. In telling of its merits, Chief Greenwood said:

"First, it never gets drunk; second, it never throws brickbats, and the only drawback connected with it is, it cannot vote."

Our illustration is made from an old deguerrotype. The Lattas, who built the first fire engine, are still engaged in the business in Cincinnati.

The "Uncle Joe Ross" marked a new era in fire service. Since then there has been a steady and rapid improvement all over the world, until now in many cities may be found "self-propellers" running by their own steam and faster than horses could draw them. We illustrate one of these in service in Boston. It weighs 17,000 pounds, will pump 1,350 gallons of water per min-



THE FIRST STEAM FIRE ENGINE.

At that time, says the Fireman's Herald, the hand engine organizations of Cincinnati had fallen into a low state of existence. Fights between companies were almost as frequent as fires and the fire station scenes of carousals and debauchery had driven all the better element out of the department.

ute, and will travel forward or backward at the control of the engineer.

Another late invention which would have amazed the natives in the days of the "Uncle Joe Ross" is the aerial truck, now used in all large cities. The two latest types we illustrate. One is

that built abroad and recently adopted by the fire department at Dublin, Ireland. The other was built by the Seagrave company at Columbus, O., for New York City and has an extension of 85 feet. In the operation one man can raise the ladders, two men extend the upper section to 85 feet and two men turn it to the wall of a building, the whole work being done by three or five men and requiring but 19 seconds.

GLASS-BOTTOMED PLEASURE LAUNCH.

H. E. Bemis, manager of the Victoria and Colonial hotels, belonging to the East Coast Hotel Company at Nassau, is having built at Palm Beach a launch forty-eight feet in length, with twenty-eight feet of plate glass bottom. This will be used for trips to the sea gardens, says the Marine Journal. Prior to this innovation, the only way for the tourists to see the wonders of marine plant life was through buckets with glass bottoms and small rowboats with small glasses. Mr. Bemis conceived the idea of a large boat with power and a large space with plate glass bottom, which would enable the tourists to get a better view of plant life, which is very rare in many of the bays surrounding the island. This is the only boat of its kind ever built. Rowboats with glass bottoms are already in use on the Pacific coast.

ELECTRIC HOISTER IN THE BOWELS OF THE EARTH.

Lifts Material from a Depth of 1,700 Feet—Electric Lights and Signals.

Deep down in the mountain in a chamber dug from the solid rock in a mine near Brunswick, Germany, is an electric hoisting machine, which with the aid of tributary machinery lifts loads of material from a depth of 1,700 feet in the bowels of the earth. Probably there is not another mine extant so admirably equipped with electrical signaling apparatus and other conveniences as this one. Throughout the enormous depth there is a net work of telephone and telegraph wires which make it possible to communicate with every department instantly and without fail. The mine throughout is brightly lighted with electric lamps.

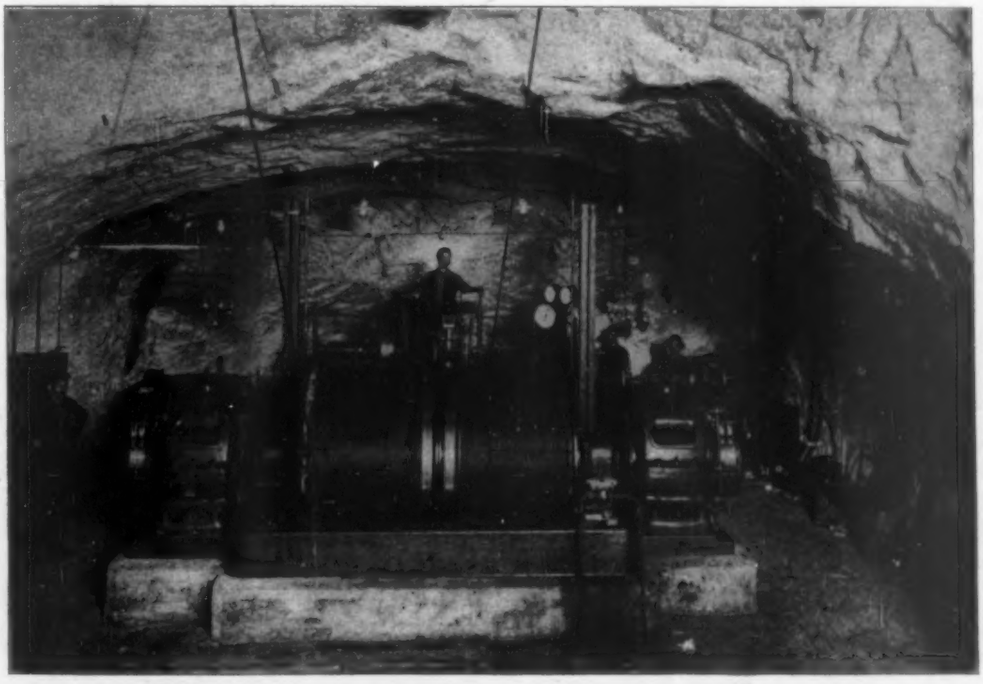
The mine is that of the Thiederhall company in Thiede. The mining machinery is operated entirely by a direct current system of electricity. The electrically operated windlass is driven by two direct 500-volt motors of 150 horse-power each. The motors are shunt-wound and are capable of elevating a load of material at the rate of 400 feet a second.—Western Electrician, Jan. 25.

TO CROSS THE OCEAN IN A BALLOON.

Drag Rope Makes It Possible, Says Aeronaut King, and Marks a New Era.

The invention and use of the drag rope has introduced a new era for the balloon, according to Aeronaut Samuel A. King, in the Century. He says that this simple appendage makes the ocean voyage a possibility.

"Such an undertaking," says King, "should have a clearly defined motive, namely, nothing less than that complete demonstration of the latent possibilities of navigation by balloons instead of the impossible flying machine for which the world has been waiting so long. If a balloon capable of retaining its buoyant gas in a marked degree were to ascend from any point on the American coast line, and be kept poised at a given height by means of a rope or ropes trailing loosely over the waves it would be more or less speedily wafted across the Atlantic ocean. West winds, of course, could not be expected always to prevail, but as it is known that the general drift is eastward, it surely follows that the passage could be made."

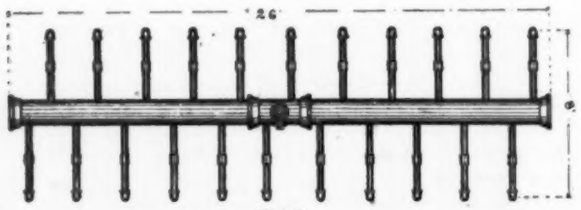


ELECTRICAL HOISTING MACHINE IN ROCK CHAMBER.

The velocity of steam does not vary directly with the pressure. The velocity of steam at 180 pounds gauge pressure is 1,969 feet per second, and at 100 pounds 1,876 feet per second. The theoretical velocity of water at 100 pounds pressure is 122 feet per second.

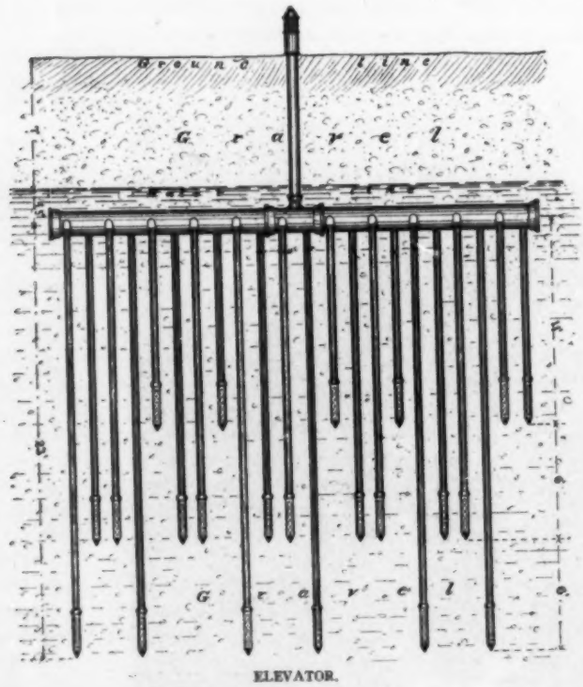
DRIVEN WELLS FOR FIRE PURPOSES.

Janesville, Wis., has a driven well for fire purposes which has proven to be a great improvement on cisterns. It consists of two twelve-inch water pipes connected so as to extend in a line and a five-inch wrought iron pipe all connected to a central T, the wrought iron pipe extending to the surface, and on both sides of the water main, or reservoir, points put down at irregular depths, from 10 to 20 feet. The points are driven from four to six feet from the main and in line with the nipple to which they have to be coupled.



PLAN.

Before laying the apparatus the earth should be excavated to the level of the water, where the excavation should be not less than 28 feet long by 14 feet wide. This kind of water supply, says Municipal Engineering, cannot be obtained in all localities. The water line must be within reach of the suction of the engine, and the points no matter how deep they are must rest in a gravel formation. The placing of the twelve-inch water



ELEVATOR.

pipe, to which the points are all connected two feet below the water line, gives a free flow of water in the pipe under an 18-inch head, faster than any steam fire engine can take it out.

SHINES LIKE THE SUN.

Peter Cooper Hewitt, of New York, proclaims to the world a discovery which he promises will make a new era in electric illumination. At the Engineers' Club, where Mr. Hewitt lectured on the discovery a few nights ago, one of his lights hung over the entrance of the building, shining like a miniature sun, and another in the lecture room made the interior seem like day.

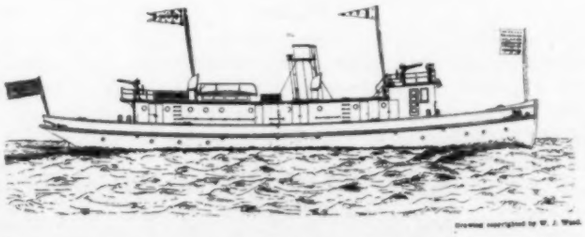
In his exhibition Mr. Hewitt employed a long glass tube, charged with mercury gas. Through this the electrical current was passed and at once a cylindrical shaft of light appeared in the vessel, corresponding in its position with the tube's axis. From the tubes emanated a steady, constant violet light, shading off to a blue green. The lamp over the street door sent its rays over a wide area. Even the blackness which prevailed about the top of the high buildings directly opposite the club house was penetrated by the light. The mercury gas caused the violet tone of the light. Roughly epitomizing, Mr. Hewitt's discovery is somewhat similar in its working to the common Edison globe with a gas or vapor as the conductor in the place of the film usually employed.

LARGEST FIRE BOAT EVER BUILT.

Powerful Steel Vessel Made to Crush Its Way Through the Ice and Dodge Other Craft.

Milwaukee is to have the largest and one of the most efficient and powerful fireboats ever built. It is now in progress of construction under the supervision of W. J. Wood, naval architect, of Chicago, who made the plans.

In her duties of crushing her way through the ice gorges, darting about among the many vessels that line the busy Milwaukee harbor, the new boat must necessarily be something more



than a mere floating pumping station. Built of open-hearth steel, she is almost proof against damage when bumped against wharves or other vessels. The rudder is wider than that of any vessel of her size on the great lakes. It is 8½ feet wide fore-and-aft.

On deck will be a continuous steel house 72 feet 6 inches long, 14 feet wide, and 6 feet 9 inches high. The length of the boat over all is 118 feet; length between perpendiculars, 107 feet; beam, molded, 24 feet; breadth, extreme, 26 feet; depth of hold, 12 feet 9 inches; depth, molded, 13 feet 6 inches; draught, aft, 10 feet 6 inches; draught, forward, 10 feet. The two boilers, 12 feet diameter by 11 feet long, are of 60,000 pounds marine steel to withstand a working pressure of 140 pounds. The two pumps with which the boat is equipped will throw 10,000 gallons of water per minute.

THE IRISHMAN'S REPLY.

A returning tourist says that when in Ireland on one occasion he met an Irish drover with a number of cattle proceeding to a fair in the south, and stopped him.

"Where are you going to?" he asked.

"To Waterford Fair, yer hanner."

"Indeed! How much do you expect to get for your cattle?" said the inquisitive tourist.

"Shure, an' av I get £8 the head I shall not do so badly," replied Pat.

"Ah, that's a sample of your country," said the visitor. "Now take these heifers to England, and you could average £14 a head."

"Just so, yer hanner, an' av yez were to take the Lakes of Killarney to purgathery yez would get a guinea a dhrop."

Easy Electrical Experiments

FOR BOYS.

ELEMENTARY STUDIES IN ELECTRICITY.

L. P. DICKINSON.

CHAPTER V. MAGNETISM.

Nearly every one is familiar with the effects produced by the small steel "horse-shoe" magnets, so common in the amateur experimenter's laboratory. They have the property of attracting to themselves pieces of iron and steel when small bits of these metals are placed near them. Indeed, a magnet has the power of communicating its magnetism permanently to other bodies, such as needles and tools made of steel. Many a boy has magnetized his knife by rubbing it over a magnet, so that it will pick up needles and pins and other small articles. The strangest part of it is that from one magnet we can make a thousand other magnets by rubbing bits of steel over it, without in the least weakening the original magnet. What is this force which we call magnetism? Clearly it is not a fluid, as was formerly supposed, for a magnetized bar weighs no more than an unmagnetized one. And how could a magnet communicate some of its magnetism to another body, without losing some of its own properties, if the magnetic effects were dependent upon some fluid residing within the metal? Clearly the only difference between a magnetized and an unmagnetized body must be a difference in their internal conditions.

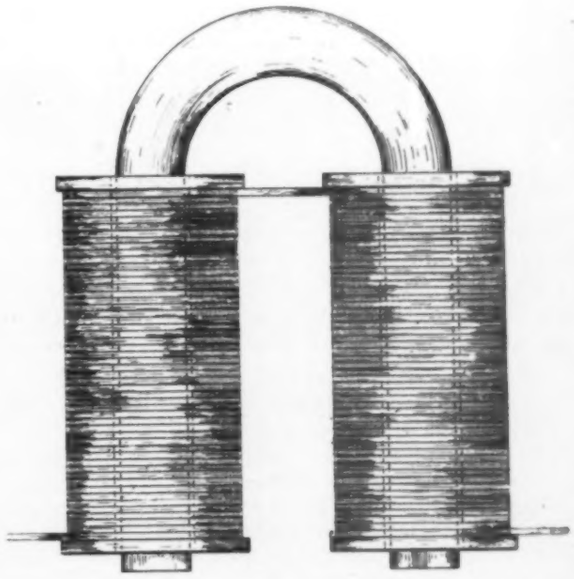
Every magnet has two poles, usually at its ends. Around these poles there is a region where the magnetism is especially noticeable. Pieces of steel placed there will be attracted or repelled. A straight bar of magnetized steel, if hung up by a thread at its center so as to hang horizontally, will turn so as to point north and south. The same end always points to the north, and is called the north pole of the magnet, the opposite end being called the south pole. If two magnets be brought close together, so that their north poles are near each other, they will repel. But if the south pole of one be presented to the north pole of the other, they will attract. The student may easily verify these statements by using magnetized sewing needles, suspended by fine silk threads.

A very pretty experiment is as follows:—

Procure a small horse shoe magnet, about six inches long. Place it horizontally upon a sunny window sill, and having lowered the window shade, cover the magnet with a piece of blue print paper such as amateur photographers commonly use. Sprinkle upon this some very fine iron filings, holding the hand some distance above the magnet, and sifting the filings slowly through the fingers. Tap the paper gently to make the filings arrange themselves in regular lines. Now raise the shade, and allow the sun to shine upon the blueprint paper for about five minutes. Then shake off the filings, and place the paper in a dish of water. A beautiful picture of the magnetic field around the magnet will be obtained. The experiment may be varied by using a photographic plate, exposing it to lamplight instead of daylight, thus obtaining a negative from which a fine print may be made.

Electric currents may be made to produce magnets. Many persons for this reason confuse magnetism and electricity, supposing them to be one and the same thing, but they are not. A powerful magnet operated by an electric current may be made as follows:

Have a blacksmith cut for you a rod of soft iron or steel, 12 inches, long, and ⅝ inch in diameter. After being cut it should be bent into the form of the letter U, with the parallel arms of the bar about 1⅞ inches apart. Make two wooden spools, each 3½ inches long and 1¾ inches in external diameter. There should be a hole through the center of each spool, ⅝ inch in diameter, so that they will slip on the arms of the iron bar just described. These spools are, of course, best made in a lathe, but the writer has made them with no tools but a ⅝ inch bit, and brace, and a sharp jack knife. In the latter case it is better to cut out the shank of the spool separate from the ends of the spool, and to glue the parts together with the aid of a few small brads. The shank of the spool should be as thin as is consistent with mechanical strength.



On each spool wind nine layers of No. 18 double cotton covered magnet wire. Be sure and wind each layer evenly and tightly, as this adds much to the appearance of the finished coil. When wound, slip the two spools of wire upon the iron core, and wedge them tightly in place. Connect one end of the first coil to one end of the second coil. Be sure, however, that they are connected in the following manner. Holding the magnet with its ends toward you, imagine a current to be flowing into one terminal of the left hand coil and out at the other, so as to go around the magnet core in the same direction as the hands of a clock move. Connect the terminal of the first coil by which the current leaves the coil to one terminal of the second coil, in such a manner that the current will go around the second coil in a direction opposite to that in which the hands of a clock move. Looking at the end of the magnet, the current will seem to trace a figure 8 in going around the coils. Connect the two loose terminals to a powerful battery, and it will be found that the iron core becomes strongly magnetized whenever a current flows through the coils, but that it loses nearly all its magnetism as soon as the current ceases.

(To be continued.)

CARE IN BURNING OIL.

In firing with petroleum, if the fire should go out, as it sometimes does when water is mixed with it, the oil continues to spray onto the hot furnace, generating a gas. If you attempt to light the fire the gas will explode with violence, says the Mining and Scientific Press. First shut off the flow of oil, then blow the gas up the smokestack, then you can light the fire with safety. Never venture near a barrel or other vessel which has the petroleum in it, with a naked light, as it is liable to have gas in it, and is more dangerous than when full of petroleum.

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ROD THAT ACTUALLY LOCATES METALS.

Earth's Secrets Revealed by a Remarkable Electrical Appliance.

The "electric metal locator," a scientific divining rod, which may be relied upon to divulge earth's secrets, has been invented by Fred H. Brown of Chicago. Already it has revealed gold mines in Idaho, Oregon, Missouri and Canada and a company incorporated for $1,000,000 under the laws of Oregon, has purchased the invention.

The device is based on the principle that an electric current will make a ground circuit along the lines of least resistance. It being known that a metallic streak in the earth is a better conductor for the current than the ground on the earth side of the metal makes it possible to take readings with the instrument and to accurately locate ledges of metal.

The rods are stuck into the ground on a claim where metal is superficially traced. Wires are strung between the rods and as the rods are moved along on parallel lines, the resistance given the electric current is read on the instruments. Where the least resistance is found it is generally the occasion for the operators to throw their hats into the air and order a hole dug instanter.

The claims for the electric locator are that it will show the exact location of a vein or ledge of metal; give the depth of the metal from the surface within a few feet; approximately give the width of the vein; tell if no metal is present on a claim. It will not indicate the kind of metal.

ALCOHOL AS FUEL.

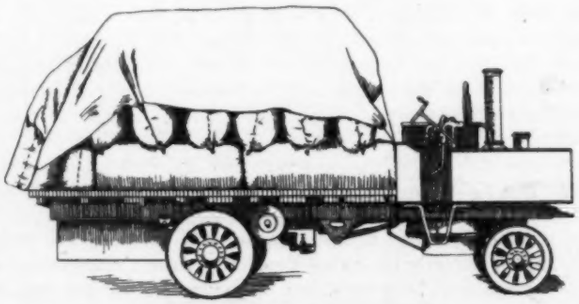
Discussing fuels of the future, the New York World makes some curious statements concerning alcohol. It can be made anywhere, burns without smoke, is cheap to transport because it is highly concentrated. The emperor of Germany is encouraging the growing of potatoes as raw material for the manufacture of fuel alcohol. "An exhibition in Paris of appliances for burning it industrially attracted visitors from all Europe, and practicable alcohol engines up to twenty-five horse-power were shown. In our own state the Cornell University School of Forestry is making cheap alcohol from the hard timber left uncut by Adirondack lumbermen because it would not float down to their saw mills.

"Alcohol can be made from fruits, grains, vegetables, from straw. M. Sartiaux gives its lowest cost of production at 15 cents a gallon, equivalent to 7½ cents a gallon for petroleum, which has but half its fuel value At this rate the new fuel is cheaper than kerosene in Paris, and should be here when its manufacture is perfected. The use of alcohol, whose materials are grown by any farmer and cannot be monopolized, would free industry from the trusts which control both coal and oil. It may prove of great value to humanity everywhere."

LARGEST WAGON EVER BUILT.

Colossal Thornycraft Wins Gold Medal at Liverpool Trials.

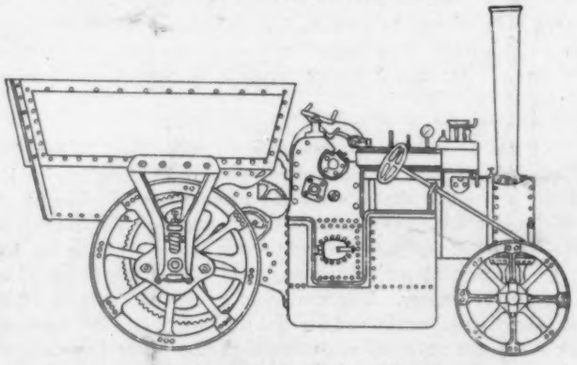
The Thornycroft steam lorry, which won a gold medal at the Liverpool Trials, is said to be the largest wagon ever built. It is designed exclusively for heavy traffic. The frame is of channel section steel, says the Motor Age. The boiler is fixed to



LARGEST WAGON EVER MADE.

the frame work just behind the front axle. It is made entirely of steel and is fired centrally through a shoot on top.

The driver's seat is behind the boiler. The throttle valve is on the right side and is provided with a spindle and a hand wheel in easy reach of the driver. The coke bunkers are on either side of the boiler and hold sufficient for a 50-mile run. Two water tanks are used, one beneath the frame at the back and the other



ANOTHER TYPE OF STEAM WAGON.

at a higher level. The engine is of the two-cylinder compound type, having cylinders 4 inches and 7 inches in diameter by a 5-inch stroke. It is fixed horizontally beneath the framework. The lubrication is of the splash principle, and the bearings permit of a speed of 800 revolutions per minute, and develop as much as 35 horse power.

Harley Smith of Jay county, Indiana, has a farm of 400 acres which is to be given over entirely to the raising of quail. It will be the only regularly conducted quail farm in the world. As the result of experiments, Mr. Smith says the quail can be domesticated and can be made decidedly more profitable than any other kind of fowl.

AN ENGLISH POWER STATION

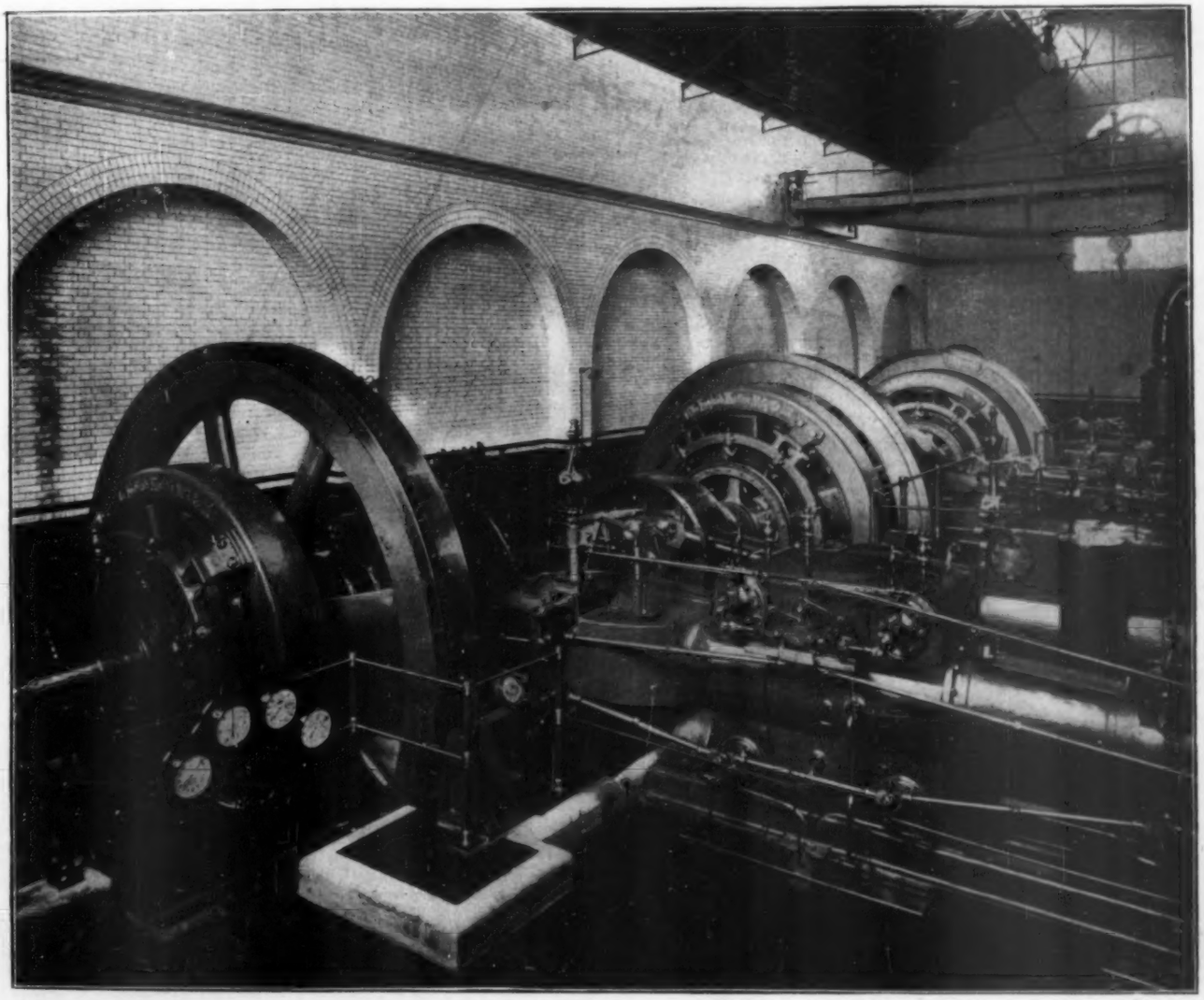
The street railway system of Portsmouth, England, has recently been changed from horses to the trolley system, and is the largest municipally owned and operated road in the south of England. There are about 30 miles of track upon which are run 80 cars of the double-deck type, the upper deck of seats being open and reached by a winding stairway at each end of the car.

The Street Railway Journal in an interesting illustrated article of Jan. 4, gives a thorough and comprehensive account of this road. The power station is described as follows:

"The steam plant comprises three boilers of the water tube type, each of which is capable of evaporating 12,000 pounds of water per hour at a working pressure of 160 pounds per square inch. Two of the engines are horizontal cross-compound type with Corliss valve gear, each developing 640 ihp under normal conditions and at the most economical load, and 900 ihp at their maximum load, when running at a speed of 90 to 100 r. p. m., and with a pressure at stop valve of 150 pounds per square inch, and working condensing. The third engine is of the horizontal tandem-compound type with Corliss valve gear and develops 320 ihp under normal conditions with an overload capacity of 450 ihp running under the same conditions as the larger machine.

"In the two larger sizes the diameter of the high pressure cylinder is 18 ins., low pressure 36 ins., stroke 42 ins., diameter of piston rods 4½ ins., diameter of crank shaft 17½ ins., and diameter and length of main journals, 14½ ins. by 26 ins. The diameter of the fly-wheel of the large sets is 18 feet and weighs approximately 25 tons.

"The diameter of the high pressure cylinder of the smaller engine is 15 ins., the low pressure 30 ins., the stroke being 36 ins. The diameter of fly-wheel is 16 feet and weighs approximately 22 tons.



ELECTRIC RAILWAY POWER STATION, PORTSMOUTH, ENGLAND.

"The fly-wheel is provided with a flange for coupling to a corresponding flange on the armature spider of the generator, the object being to take the heavy, sudden strains of overload off the shaft and keys."

Head of a Foreign Missionary Bureau—Where would you prefer to locate as a young missionary?

Young Missionary—Well, if possible, where the natives are vegetarians.—Brooklyn Eagle.

PROPER INSTALLATION OF THE BLOW-OFF.

Danger and Waste Result from Its Neglect and Wrongful Application.

It is very hard to impress on the mind of the average engineer the importance of the blow-off as a scale remover, says the Practical Engineer. When the blow-off of a boiler is wrongly arranged or improperly handled, it is likely to give rise to a

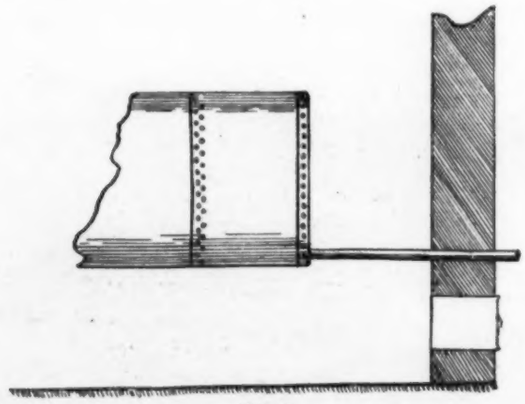


FIG. 1.

never-ending source of trouble. It is a simple looking contrivance, yet there is no other attachment except the safety valve and water gauge, that is worthy of more attention and thought.

Blow-off pipes are frequently so arranged that they enter the front or back head, as indicated in Fig. 1. This is exceedingly incorrect. The idea in placing the pipe in such a position is that it will not burn off by having sediment lay in it in sufficient quantity to allow it to become overheated. But by placing it this way you destroy its efficiency in removing the sludge, the boiler can never be drained dry without siphoning, and it is impossible to "wash" the bottom successfully owing to the poor method of drainage.

The proper place of attachment for the blow-off is about four inches from the rear head, immediately in the bottom of the

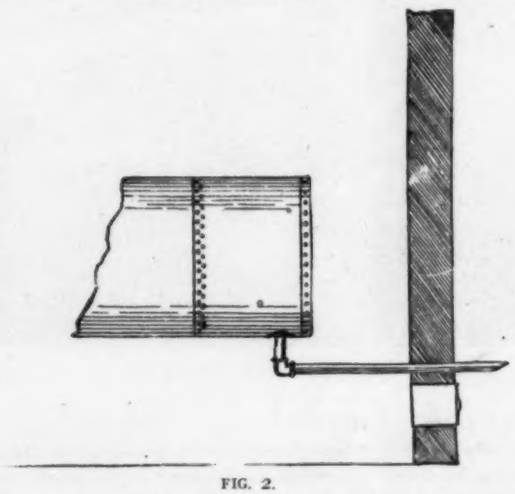


FIG. 2.

shell, as shown in Fig. 2. A careful study of Fig. 3 will show the correct method of placing the pipe and the proper jacketing. The upright pipe should be run, as shown, beneath the flooring and then out through the brickwork. This being done a complete jacket should be put over all, of such diameter as to ensure quite a space between the jacket and pipe. The outer end of the jacket should be exposed to the air in such shape that it may act as a minature chimney to carry a supply of cool air in and around the blow-off pipe. This is accomplished by cut-

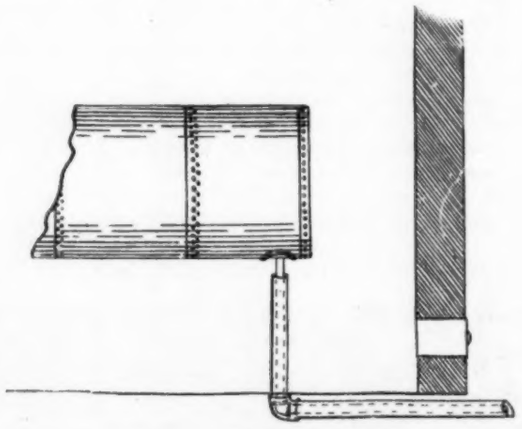


FIG. 3.

ting the jacket, as shown, three inches short of the boiler, and blocking it in at, say, three places, to ensure rigidity.

STRONGEST ARTIFICIAL LIGHT EVER PRODUCED.

All Who Looked at It Were Blinded for Days—Physicians Astounded.

What is believed to have been the most powerful artificial light ever known was produced at Buffalo in removing a "salamander" from a furnace of the Buffalo Union Furnace company. A salamander is a mass of iron and refuse in a blast furnace that accumulates until it becomes necessary to clean it out and reline the furnace with firebrick. Drilling proved so slow that it was decided to burn holes in the mass by means of an electric arc. The carbon, which was made especially for the work, was 72 inches long and two inches in diameter. It required all the power of two dynamos that supply the electricity for the entire works and for operating an electric crane. Frederick D. Gatchell, chief electrician of the company, said:

"We had a current of 350 amperes and a voltage of 220, which represents about 100 horse-power. I connected the positive side of the circuit to the furnace, using a water pipe for a binding post, and the negative side to the carbon. When the current was turned on a light was produced that equalled about 308,000 candle-power. It was equal to about 160 of the arc lights used for street lighting. This produced a heat of nearly 5,000 degrees. We burned a hole with this apparatus, 4 inches in diameter and 25 inches deep, in four hours. Into this dynamite was placed and the mass was broken up into small pieces.

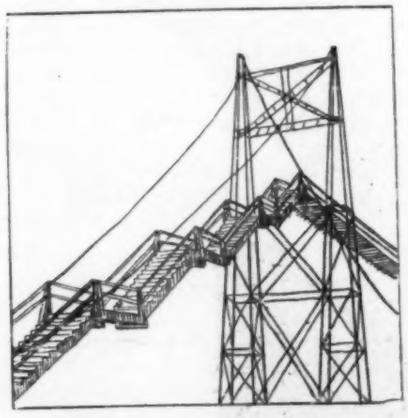
"All who looked at the light suffered from severe inflammation of the eyes. The only exceptions were two men who wore plain white glasses. Before I reached home I was nearly blind and in terrible agony. My physician was completely puzzled. My eyes were bloodshot and the lids so inflamed that they were completely closed. The ailment continued for four days. The skin on my face peeled off. The doctor could not account for the trouble unless it were that the light was of too great a volume for the optical nerves to accommodate. He was entirely at a loss to account for the manner in which my face was affected.

The star boarder who was reading his paper at breakfast suddenly gave a low shriek and fell to the floor. Kind hands lifted him to a couch, and somebody went for a doctor. The more curious among those present picked up the paper and saw what had shocked him. It was an item reading:

"California will ship sixty million pounds of prunes to the Eastern markets this year."—Baltimore American.

ODDEST BRIDGE IN THE WORLD.

Unlike any other bridge in the world is the new structure across the Lehigh river, the Lehigh Coal & Navigation Co.'s canal and the tracks of the Lehigh Valley railroad at Easton, Pa. It is a suspension foot bridge, 804 feet long and only ten feet wide. Its north approach is 90 feet higher than its south approach; it has two river spans instead of one, each 279 feet long; and it has a star span that is 110 feet in length.



To overcome the unequal elevation of the bridge, the floor is run down on a 7 per cent grade from the north bank to the river tower. From this point to the low end are four runs of stairs, the whole being suspended from the cables. It was necessary to resist wind pressure by running guy ropes from the center of the two main spans to shore. The bridge has steel towers resting on stone piers, which are built up to extreme high water level. The height of the center tower from low water to the top of the saddle is 108 feet. It has two steel wire cables, each 2⅜ inches in diameter, and ¾-inch suspenders. The steel stiffening trusses are 5 feet 3 inches deep. They are broad laterally at panel points to the floor beams. The bridge has wooden joists, a plank floor and wooden handrails. It was designed by H. G. Tyrrell, of Boston.

OYSTERS IN KANSAS.

The people of Kansas are not one whit behind the times. The claims of bigger grasshoppers, largest pumpkins and fiercest cyclones will be forgotten when she raises her own oysters.

There are immense salt wells in the state. An enterprising man who owns some of these wells has had an immense lake made, and turned a flow of "fresh" salt water into it. The pond is from 3 to 30 feet deep and 14 miles long. He is planting the lake with living oysters, the finest he can secure, shipped by fast express from the Atlantic coast. The success of the novel undertaking remains to be seen.

MAIL CAR THAT RUNS FOUR HUNDRED MILES AN HOUR.

A mail car which the inventor claims may attain a speed of 400 miles an hour has been built by Edward A. Kelly, of Norfolk, Va. He expects it to be adopted by the United States government for the mail service. The car is made of metal and operated by electricity.

The vehicle is shaped like a ship. The power used comes under the magnet system and conveys the current to the car from large tapering iron plates. Mr. Kelly says the car will go from New York to Washington in an hour.

CIRCULAR MIL.

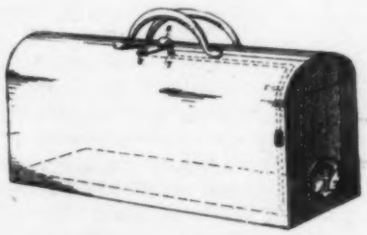
A Circular Mil, as the term is employed to measure the cross-sectional areas of wires used in electrical work, is .7854 square mil, the mil being .001 inch. The electrical resistance of a wire 1 foot long and having one circular mil cross-section area, being known as the result of experiment, the electrical resistance of another wire of the same metal and different cross-section is readily calculated.

TESTING STRENGTH OF GLUE.

In making tests of the quality of glue and the adhesive strength of joints made with the glue at different states of fluidity, a good test is to take two pieces of the wood being worked, 1x4 inches in size, and glue them together with a lap of 4 inches. When "set" and dry, stand the block on end and try to break the joint by striking with a heavy hammer, says the Wood-Worker. The fracture produced will determine if it is the glue or the wood that has let go and will give a fairly correct idea of the strength of the glue used.

ELECTRIC LIGHT ATTACHMENT TO A TRAVELER S GRIP.

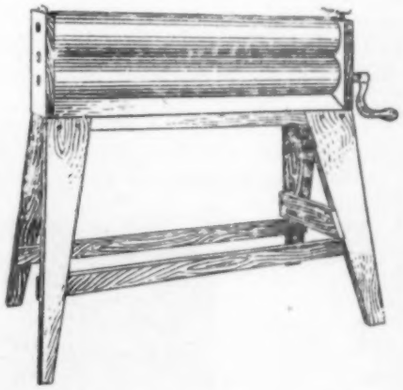
A California traveling man who has probably had difficulty in groping his way in the dark in small towns, has invented a grip which contains a complete electric



lighting apparatus. The lamp is located in a glass case in the side of the grip and may be turned on by shifting a switch lever under the handle at the top. A dry plate battery of tabular form is contained in the bottom. Conducting wires lead through the lining of the satchel from the battery to the lamp and the switch lever. The light may be turned off or on at pleasure. The inventor is William W. McCormick, of Santa Rosa, Cal.

A SAW HORSE FOR TINNERS.

"The 'tinner's saw horse' is a model of convenience," says a contributor to the American artisan. It is made by fastening the rolls, folders, etc., to a wooden horse, like those of the carpenter's saw horse. The top and back of the horse should be as wide as the base of the machine, and the legs made of 2x6 timbers, tapering toward



the bottom. The inventor claims that they are convenient to approach with large and odd-shaped work; when wanted they can be brought out into a convenient place, and when not in use may be set aside in a corner or other small space.

BABBITTING PULLEY SLEEVES.

A correspondent of Steam Engineering gives the following method of babbitting pulley sleeves, which he says is a good one, if the sleeves are turned on the outside.

Take a piece of shaft the size of the shaft on which the pulley runs, or, say 1-64 inch larger. Take two collars and bore them the size of this arbor. Countersink one end of each and put one collar on the arbor with the countersunk side up. Place the two halves of the sleeve on the arbor resting on the countersunk part of the collar, then slide the other collar down on the sleeve, catching the sleeve the same way. Have two holes drilled through the top collar, one on each side, to pour the babbitt through; separate the two halves with strips of tin well coated with white lead, or something of that kind. It will be seen that the collars will bring the sleeve central with the arbor. When the rig is adjusted one side can be poured and then the other. All that is required to hold them in place is something to press down on the top collar.

TOILS WITHIN THE GRASP OF DEATH.

Most Perilous of Occupations Is That of the Oil Well Shooter.

"Risking one's life from one to a hundred times a day, never knowing when he leaves home whether he will return alive or whether the earth will be strewn with his fragmental remains, is not the most pleasant life in the world," said the old oil-shooter, "but such an occupation is necessary that people may have oil to saturate the wick of their parlor lamps.

"Nitro glycerine, which is death in concrete and bottled up form, and the 'go-devil' are the two principal foes to longevity with which the oil well shooter is in constant companionship. 'Toying with death,' the phrase commonly used in describing the shooter's occupation, is erroneous. He avoids as many as possible of the thousand chances of being blown into atoms that might present themselves in a day. The shooter's return for shaking hands with death every day of his life is a fairly remunerative salary, possibly $100 a month. It is a business that has no fixed hours or union scale of wages. Its duties are calculated to keep untrained nerves continually on edge.

"The stock wagons used in transferring nitro-glycerine from the factory to the different magazines hold 90 cans, enough to wipe out a whole town. The shooter's wagon is smaller, having a capacity of from 12 to 28 cans. There is something uncanny in the very sight of one of these wagons, with a sign painted on the sides and back in yellow letters, large enough to read a quarter of a mile away.

But the shooter, sitting above the concen-But the shooter, sitting above the concentrated extract of annihilation, complacently guides his team as the wagon bumps along over rough roads. It is generally claimed that ordinary concussions will not explode nitro-glycerine, but the shooter always looks after the spring of his wagon, because the history of nitro-glycerine explosions has more weight with him than any theories as to the nature of the death-dealing substance. He knows full well if the wagon load of the dangerous stuff does 'go off' while he is driving it, the chances of his escape are not worth considering.

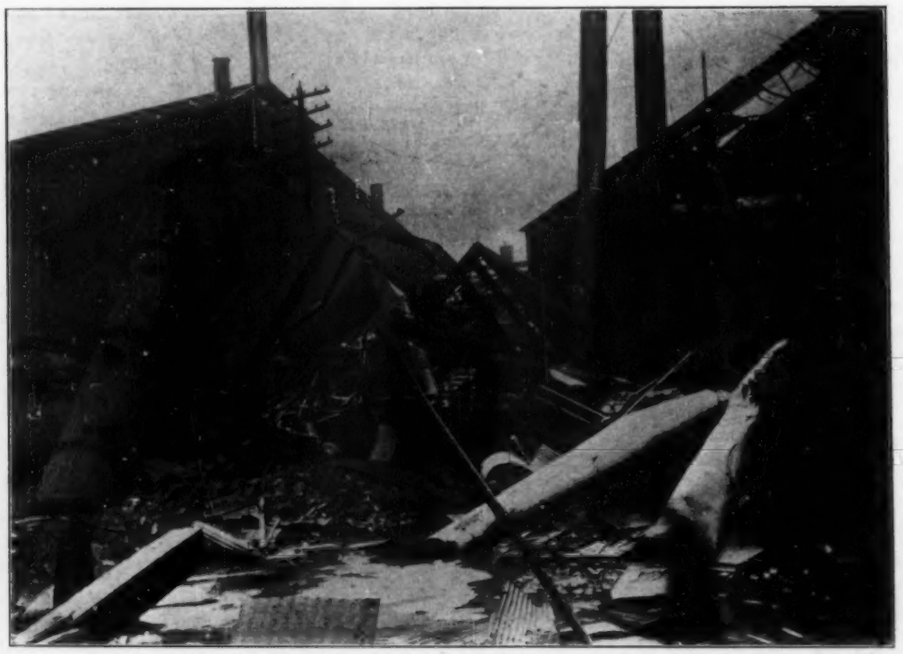
"The last shell, called the 'firing head,' is filled with nitro-glycerine and sunk into the well. The cord is unhooked and reeled up. Here is where the 'go-devil' comes in. It is a piece of casting, about 15 inches long with wings extending out about two inches on each side and painted at one end. The 'go-devil' is dropped into the well. Long before this all but the shooter have fled to safe grounds. The shooter promptly but not hurriedly retires. Thirty or fifty seconds elapse, a jar is felt and a column of dirt and water spurts high above the derrick. If oil has been struck it will follow up afterward.

"As soon as it appears that the attempt has been successful, the shooter may hitch up his team and drive home. If not, if some of the thousand and one possible accidents happen the victim's friends sorrowfully gather up such portions of his anatomy as can be found and hold a funeral over them. A cigar box is usually sufficient to contain the remains of the man who receives the full force of a charge of nitro-glycerine."

TERRIBLE RESULTS OF BOILER EXPLOSION

Cause Is Attributed to Turning Cold Feed Water Into the Boilers.

Four known dead and 30 injured are among the disastrous results of the terrible boiler explosion at Park Brothers' mills of the Crucible Steel Company of America at Pittsburgh, Pa. Three return tubular boilers exploded almost simultaneously, scattering fragments all over the neighborhood. Of the eight boilers in the plant only two escaped serious injury. Two flew into an adjoining plant, one burst into a hundred pieces, two were driven against a wall of tangled iron stacks, a piece of another crashed clear through a brick house a square away, and other heavy pieces passed entirely over the building, burying themselves in the earth when they fell. Just how many were actually killed and injured may never be known, as the company refuses to give out any information. There were 100 men working in the building at the time, and it seems miraculous that the list of dead and injured is no greater.



RESULT OF BOILER EXPLOSION, PITTSBURG.

Taking all points into consideration, says the Practical Engineer, it seems that the explosion was caused through turning cold feed water into the boilers, which had too little water in them at the time.

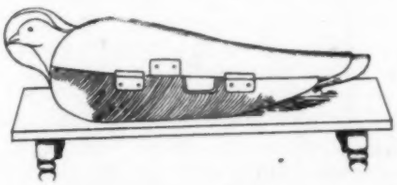
A company has been organized to construct a suspension bridge for railway and other purposes to span the Strait of Canso, between Nova Scotia and Cape Breton Island. It will be the highest suspension bridge in the world.

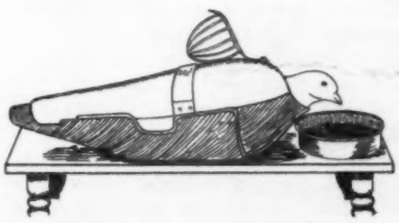
PIGEONS CARRIED IN METAL CASES.

Veteran Birds of the South African War Exhibited in London.

A new machine for transporting pigeons consists of metal covers, made to fit the pigeons, and so constructed that the bird can be fed without letting it loose. The accompanying cuts show the contrivance, both open and closed.

Homing pigeons took a conspicuous position in the sixth annual display of the London North Road Federation at the Royal Acquarium. Some of the birds were veterans of the South African war, having





carried dispatches from Ladysmith. Altogether there were 1,002 birds on exhibition, 927 being of the competitive class.

Carrier pigeons released from Milwaukee, Wis., not long ago, made a new record in flight, traveling 81 miles in an hour.

In transporting the pigeon from the place to which it is to fly back, the bird is kept in a dark cage. On arriving at destination, the message is attached to one leg or about the neck, and the bird released. It rises to a height of several hundred feet, circles about once or twice to get its bearings, and then darts swiftly away in the right direction. Whatever instinct it is which enables the pigeon to do this, it is certainly a wonderful power.

LONG DISTANCE FOG HORN.

A foghorn to be heard twelve miles away is being placed in the Gulf of St. Lawrence. It is 4 feet in diameter at the outer end and 12 feet long, the sound being produced by driving compressed air through a double set of valves carrying revolving discs with holes cut in them. One set of discs produces a deep roar and the other a shrill shriek. Clockwork controls the valves, and every two minutes there is a roar and ten seconds later a shriek. The horn is operated by compressed air contained in three tanks, each 6 feet in diameter and 12 feet long, and the compressors are worked by three oil engines. The sound can be heard at a distance of even 15 mile on a favorable day.

ELECTRIC SIGNALS TO RECORD MAIL COLLECTING.

An electrical appliance to record collections from mail boxes will be established by the postoffice department in Toledo, O., as an experiment. The object is to prevent collectors from skipping boxes. The device is so constructed that whenever a box is opened a record of the opening is signaled to the postoffice.

COLD STORAGE DOES NOT PRESERVE FOODS.

Cold storage does not save meats and other edibles from deteriorating in a tangible way, according to the Sanitary Record. Those who eat them for any length of time develop diarrhoeal disorders, lose in weight and would eventually starve to death unless a change in diet were made. The same applies to tinned fruits and vegetables. They should not be eaten after a certain period has elapsed. Especially should people be warned against eating stale eggs and old milk and cream. All food, especially cold storage food, is damaged by long keeping and will not properly nourish the body.

SAYS THE CHINESE INVENTED THE COMPASS.

It has been proposed by the Italian journals, says the Coast Seaman's Journal, to celebrate next year as the sixth century of the mariner's compass. It is to be in honor of Flavo Gioia, who, according to tradition, invented the compass in 1302. Gioia is supposed to have been a resident of Amalfi, near Florence. A careful research fails to reveal any such name among the residents of that city, and the records make no mention of the compass in the inventories of vessels. Father Bertelli, of the "Unita Cattolica," Florence, has furnished a contribution in which he declares that the Chinese were the first to discover the valuable directive property of the magnetized needle, and that its use was introduced into Italy nine centuries ago instead of six centuries ago.

MUTE VIOLIN FOR PRACTICE.

To render a violin mute, make a bridge of bone or ivory, of the same pattern as the ordinary one, but omitting the perforations. Make the feet rather wider than usual, and glue a piece of kid under them to protect the soft wood of the violin belly. Use in addition to this a rather heavy metal mute, and if this does not suffice, further kill the sound by pasting pieces of paper over the sound holes or by stuffing them with cotton-wool. If these plans are carried out there will be but very little sound, and the violin can be restored to its former power in a few minutes if required.

MELON KING NOW BUYS FISH AND GAME.

First to Place the Deliciously Flavored Texas Frog on the Market.

Nat Wetzel, "the melon king," who earned his title by cornering the melon market of the country several years ago, is now in Beaumont, Texas, and has his eye on the fish and game market. He has been there for some time, presumably, making that city his headquarters while engaged in hunting expeditions. It is learned, however, that while doing his "hunting," he has made arrangements for a mammoth cold storage to be stocked with fish and game. He has bargained with rural residents for $30,000 worth of frogs, almost an equal amount of ducks, squirrels and quail as many as can be tendered him, fish in wholesale quantities, all of which he will ship to northern markets through previous arrangement.

Millions of frogs, the finest known, inhabit the Neches river and its tributaries in the vicinity of Beaumont, but this is the first step that has ever been taken to place them on the market. The native Texans do not consider them proper food for the table.

LIFE PRESERVER THAT MAY BE PROPELLED.

Lorenzo Genta, chief officer of the Italian ship Narcissus, has invented a life preserver which will not only keep the wearer afloat in the roughest sea, but will enable him to propel himself to a place of safety. The inventor will cross the English Channel in his new device to prove its efficacy.

The preserver is in the form of that part of a life-boat forward of the beam. It is attached to the back of a person's head, shoulders and body, leaving the arms free. The wearer, when in the water, lies prostrate on his back, and the apparatus is kept afloat by several air-tight compartments. A propeller beneath the body is operated by means of a lever and produces a speed of three miles an hour.

USELESSNESS OF LIGHTING RODS.

How Real Protection May Be Obtained By Cheaper and More Convenient Methods.

The whole matter of lightning rods was conceived in ignorance and has been exploited in folly, says the Electrical Review. No man can tell whether a lightning rod does more good than harm or more harm than good. If a house has a tin roof, it is absolutely safe, anyway. If it has a steel frame construction or is full of water pipes, it is still safer. If it is a frame house with a shingle roof, entire safety for it may be secured by building a copper house outside of it. This we believe is the only absolutely efficient lightning protection.

Great Advantages of Educating the Hand and Eye Demonstrated by Pupils.

Wonderful results of the education of the hand and eye as well as the mind is demonstrated in the achievement of pupils of the Northeast Manual Training school of Philadelphia. Here after three years' training young men are able to turn out specimens of work equal to that of many of the leading machine shops of the country. Even at the end of one and two years the student's prowess in handling tools is often a surprise to men of life-long experience. In the illustration heading this article is shown a specimen of ornamental iron work executed by the class of 1902. Another illustration shows ornamental iron work made by a third-year man. The forging work, wood work, drawing, tinsmithing, clay modeling, experiments in chemistry and electricity and the work of numerous other departments is a revelation to old -time craftsmen as to what regular course study will do in educating the hand and eye.

"The name 'Manual Training School' is frequently misunderstood," said William H. Odenatt, principal of the school. "Many who are not familiar with educational progress still believe that a manual training school teaches trades and is thus intended only for those who wish to become artisans. This narrow interpretation, however, is gradually disappearing. The system which the Northeast Manual Training School represents is based upon the principal that the training of the eye and the hand is an essential part of the training of the mind. It is now generally recognized that such courses as are offered by the Northeast Manual Training School are the best preparation for the successful pursuit of all branches of profession and business life."

The course of study covers three years. The basis of the curriculum is the usual high school course in mathematics, science, English literature, history, civics, economics, French, German and Spanish. To these studies of the ordinary high school are added courses in drawing, and in the use of tools for working wood and metal.

Each pupil in the freshman class in the course of economic forestry is taught to recognize at sight 20 or 25 of the common lumber producing forest trees. The timber of the tree is studied, its use, its elasticity, its loss in weight by seasoning and its use and value as a commercial product.

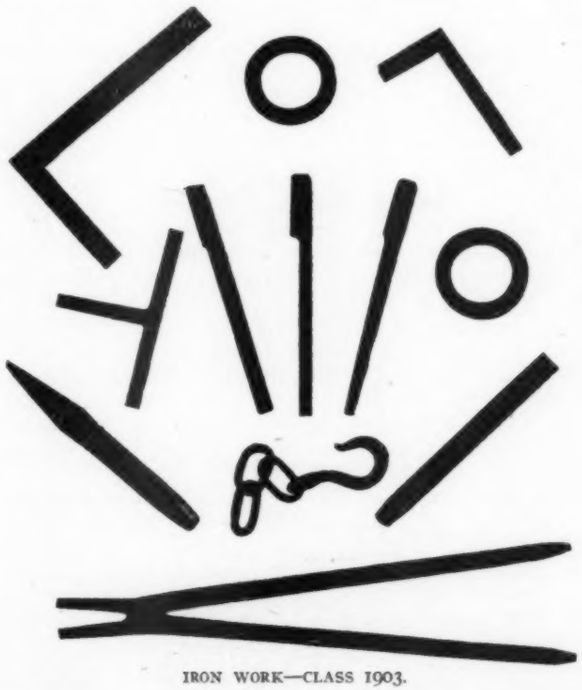
Department of Manual Training.—In the metal department the course in the freshman class is begun with moulding and casting in various forms from pig lead, also a course in core making suitable for the castings made during the moulding period.

Then follows a course in tinsmithiig, consisting of soldering, seaming, flanging, wiring and forming of projects into plane, conical and cylindrical surfaces. During the second term elementary lessons in vise work are given comprised of chipping and filing projects of cast iron into plane, angular and curved surfaces.

MECHANICAL ENGINEERING DEPARTMENT.

Elementary tool instruction is given, such as plain, cylindrical and taper turning, right and left-hand V and square thread screw cutting; boring with lathe tools and boring bar. External and internal chuck work and fitting closes with ornamental iron work from designs by the pupil.

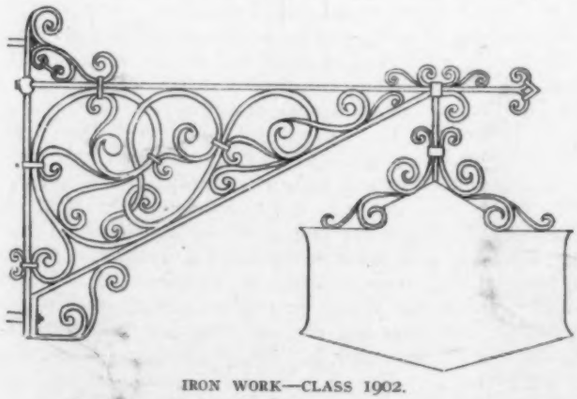
In the course there is the making and assembling of the sev-



IRON WORK—CLASS 1903.

eral parts of an engine, pump, dynamo, physical apparatus, or any project, best calculated to illustrate the more important principles of modern machinery. The various forms and construction of modern boilers and engines are explained by lectures and drawings and practical examples. The several fuels used for steam making and those best adapted to this purpose are considered.

In the wood-working department the instruction is in advanced joinery, pattern making, wood-turning and wood-carving. In joinery the principles previously learned are applied



IRON WORK—CLASS 1902.

to the making of some articles of furniture which is to be carved. The instruction in pattern making in wood is preceded by moulding in the metal department, these two branches being so closely allied that one is made dependent on the other.

The mathematician who figured out how much water to a quart passes over Niagara Falls in a year, after much mental outlay officially announces that it is two pints.

5,000 MILES OF RAILROAD BUILT LAST YEAR.

ALL RECORDS BROKEN SINCE 1890—TEXAS LEADS THE OTHER STATES.

All records of railway building in the United States since 1890 were broken by the year 1901. During the year 5,057 miles of new track were built, making the total mileage of the country at the present time 199,370 miles. It is believed that the record of 1890, which was 5,670 miles, would have been surpassed but for the scarcity of labor and the inability of steel mills to furnish rails.

Texas leads all the other states of the Union, 583 miles of new road having been built in that state during the year. Oklahoma is second with 428 miles. Next is New Mexico with 275 miles; Georgia, 203 miles; Wisconsin, 196 miles; Missouri, 189 miles; Indiana, 174 miles; Minnesota, 171 miles; Illinois, 164 miles; Michigan, 164 miles; Louisiana, 160 miles; Indian Territory, 157 miles; Arkansas, 156 miles; Pennsylvania, 153 miles. There has been very little building in the eastern and New England states excepting Pennsylvania. The longest single line built during the year was by the Chicago, Rock Island & Pacific from Liberal, Kan., to Santa Rosa, N. M., 265 miles.

FOUGHT AND KILLED A SHARK IN WATER.

A remarkable battle with a shark in the shark's native element resulted in a victory for Benjamin F. Baker, sailmaker's mate, of Brockton, Mass., and for his bravery he has been recommended by the officers of the United States Training Ship Alliance for a medal of honor.

When the vessel was at St. Thomas, D. W. I., says the Marine Journal, the crew was ordered to refrain from swimming, as the harbor was full of sharks. One night three of the crew stole overboard, taking the ship's dog with them. The dog was seized by a monster shark. Terror-stricken the three men swam for the ship, but the shark gained upon them. Baker dived over the rail and armed only with a dirk, swam directly toward the approaching shark, and diving beneath it thrust his knife into its belly, ripping it open from throat to tail. The shark measured 14 ft. 9 in. The dog had been swallowed whole. Baker has already been awarded one medal for personal bravery, as he assisted in cutting the cable at Guantanimo under fire.

CAPILLARY ATTRACTION OF SOILS.

Useful lessons in the capillary attraction of soils may be obtained with the aid of a half dozen or more glass cylinders from one to two inches in diameter and two or three feet long. Fill them with soil of different descriptions and of varying degrees of fineness and stand them in a vessel containing a few inches of water. By this you may determine the quantity of water a given bulk of each kind of soil will take and also see how the height of water in soil is determined by its compactness.

"Free water in soil," says the Gardener's Magazine, "is that which by the laws of gravity passes through it. Free water is not used directly by plants, but it becomes of great service to them when a proper distance below the surface because it forms a reservoir from which plants may obtain supplies of moisture by capillary attraction. Capillary water is that which is held by adhesion to the soil particles. It is not influenced by gravity, but passes from one part of the soil to another and tends to maintain an equal degree of moisture. Capillary water is directly utilized by plants, and its importance in the economy of cropping is very great. Hydroscopic water is that which surrounds the soil particles and is not influenced by either capillary or gravity."

A promoter is trying to organize a trust among the oakum manufacturers. Would be a calking affair.

WIND MILLS TO LIGHT GREAT CITIES.

New Storage Battery Invented by Edison Holds Out Wonderful Possibilities.

Through the use of the new storage battery invented by Edison, the lighting of Chicago and other large cities by means of a system of windmills, was suggested by Franklin H. Head in a recent lecture before the students of the University of Chicago.

"A belt of windmills around Chicago for forty miles," he said, "would supply storage batteries with enough electricity to light the whole city of Chicago constantly and possibly to heat it too. If what Mr. Edison thinks is true, he has made a most valuable storage battery for electricity. The lead storage battery in use on one street car line today is too expensive; it weighs seven tons, and has to be recharged after every eight-mile trip. The new battery Mr. Edison has invented weighs in proportion one-fourth and seems indestructible. He has had batteries in his laboratory a year and a half, and they have kept their charge of electricity. His invention is of enormous value to the world.

"There are endless sources of power about us if the power they afford could only be stored up. Take the windmill—it is not constant. But with the new Edison storage battery the windmill could run a dynamo when the wind blows and the power generated could be saved in a storage battery.

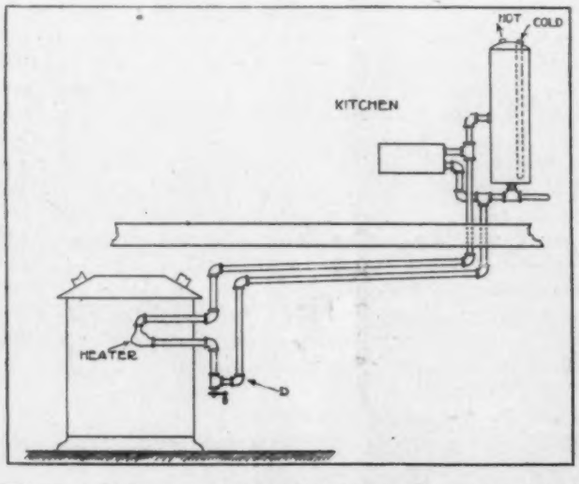
"For manufacturing purposes the storage battery would prove of great value. Take a factory where the manufacturer has 100 horse-power provided constantly. At noon when the plant is shut down there is a great waste. With the use of a storage battery the manufacturer could save all the power.

"The farmer's wind mill would mean much more to him. By the use of a dynamo and a storage battery he could have his windmill do the thrashing and cut the corn for fodder, while his wife could have it heat the flat-irons and do the churning. He might put up three windmills and heat his house without the use of fuel."

Mr. Head explained that Edison had developed a new oxide of iron, an oxide which never occurs in nature, and an unknown composition of nickel, which were used as the new battery, and explained that steel was used in the cell because of its elasticity.

TO CURE POUNDING IN PIPES.

A reader of the American Artisan asks for a remedy for thumping or pounding of hot water in his pipes which connect a furnace heater with the kitchen tank. The remedy suggested was as follows:

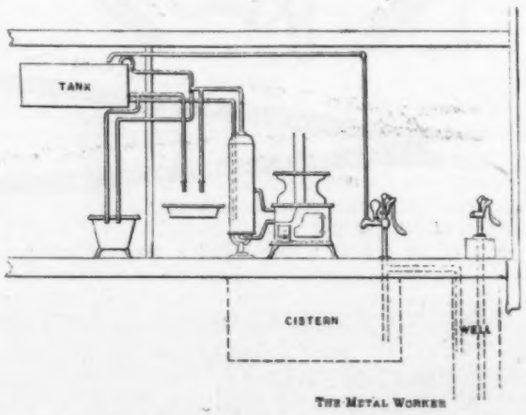


Where a hot water system gives a thumping noise, as described by our subscriber, the cause is always due to defective circulation, which results in generating steam in the heater, and by condensing quickly noise is produced. There may be no traps in the pipes, and still the noise takes place, and again the pipes may be perfectly free and clear and the noise exist. Sometimes such heaters are placed too deep in the fire box, so that they become too hot for the work they have to perform and the size connections they have between the heater and boiler. It is always a good plan in the pipe work of such hot water attachments to form a pocket or dip, as shown in the accompanying sketch at D, so that the return water will have to rise as it enters the heater. Evidently there must be some obstruction in the pipe connections, which should be carefully examined, and, anyway, it would be better to use 1-inch pipes in place of ¾-inch between heater and boiler, without reducing same at any point.

SIMPLE HOT WATER SYSTEM.

In towns where there are no local water works to furnish pressure, the providing of a hot water outfit for sink and bathroom is something of a problem. The Metal Worker, Jan. 4. illustrates a plan of piping which almost anyone can install. Water is pumped from a well or cistern as desired, into a small tank placed near the ceiling, but with elevation sufficient to furnish the necessary flow.

The bottom of this tank should be at least two feet above the top of the boiler. The water should be taken from the bottom



of the tank to the boiler, and a small pipe should be run from the tank near the top to the bathtub, so that when the tank is sufficienly full water flowing into the bathtub will give notice of it. A much larger pipe should lead from the tank at the same level out of doors, so that in case of overflow the surplus water can be discharged where it will do no harm. The pipe supplying cold water to the bathtub should be taken out of the side of the tank several inches above the bottom. The pipe which is to bring hot water from the boiler to the bathtub should run up to a height equal to that of the cold water supply to the bathtub. This will make it impossible for all the water to be drawn from the tank, and to leave the boiler without a water supply. Where the tank is so slightly above the top of the boiler, very little water pressure will be exerted, and in case of heavy firing, steam is likely to be generated. In consequence, a small pipe should be carried from the highest point in the hot water pipe and run above the top of the tank, and the end turned down over it. This is to allow for the escape of steam and air.

As a train was moving out of a Scotch station, a man in one of the compartments noticed that the porter in whose charge he had left his baggage had not put it into the van, and shouted out to him:

"Hi! you old fool! What do you mean by not putting my luggage into your van?"

The porter replied: "Ah, man, your luggage is ne'er such a fool as yourself. You're on the wrong train."—New York Tribune.

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all ordinary burns from fire, hot iron or hot water, and will absolutely prevent blister. Takes out all the burn in from one to five minutes. Will not cure everything, but is excellent for reducing inflammation and healing many chronic sores, chapped hands or lips, etc. Is made of the purest vegetable products only, and is perfectly harmless. Excellent for tightness of the throat or chest. Although in use for many years, is now put on the market for the first time. Once used, always wanted. Sent postpaid anywhere, 25 cents. If not as represented money cheerfully returned. Address

COLDBURN, Room 604
162 Washington Street, - Chicago

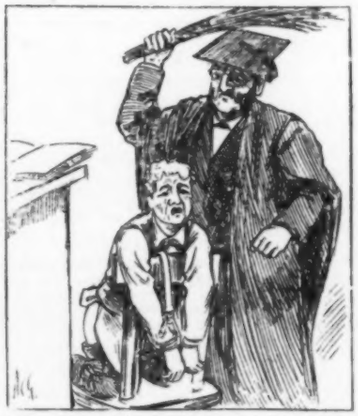
MECHANICAL BLACKSMITH.

Two pneumatic forging machines, "Mechanical Blacksmiths," now in operation at the Burnside shops of the Illinois Central railroad, are the first of this design ever constructed. So successful did the invention prove that six more are now being built. They are to be of three different sizes, says the Railway and Engineering Review of Dec. 28, two of each size, the largest having cylinders 24 by 31 inches and weighing 15 tons, the next having cylinders 20 by 26 inches and weighing 9 tons and two small machines with cylinder of 16 by 22 inches estimated to weigh 5 tons.

The "Mechanical Blacksmith" consists of a T-shaped frame or bed plate and is operated by two cylinders, one plunger and one adjustable die. On the longer arm of the bed plate is mounted the 24 by 31 inch air cylinder, the piston of which furnishes the power movement to the bull-dozing plunger. On top, at either side of the shorter arms, are the die-holding forms, which can be set to open and close at any desired distance between them, and one side of which is operated by a lever connecting with the plunger of a 24 by 31 inch air cylinder below. This machine is designed for a working air pressure of 125 pounds and some idea of its power will be gained when it is seen that it exerts a static pressure of 57,000 pounds. The rapidity with which the blows can be struck is limited only by the speed with which a man can operate an angle-cock, as the return of the plunger is effected by means of compressed air instead of the usual spring, present in other machines, while the capacity of the mechanism for turning out work is restricted only by the amount of iron that can be heated and handled for it.

It is claimed that 85 per cent of locomotive forgings and nearly every job on a car can be turned out without the aid of the blacksmith's hammer, while the terrific blow it strikes has an advantage over a squeeze of the power machine, making a more perfect job. Straps, draw-bar pockets, frame buckles, pipe clamps, valve yokes, and the like, of any dimensions, may be made from the same dies by merely applying plates to the faces of the dies of such thickness as will furnish the desired sizes. By placing liners over the face of the die used in forming pipe clamps it is possible to forge 30 to 40 different sizes of clamps in one minute, while a locomotive main rod strap, weighing 236 pounds, has been forged in 47 seconds, and a valve yoke forged complete in five minutes. Turnbuckles are forged and welded in two operations, smoke arch braces in one blow, while the thimble or eyelet for rope hoists is bent and grooved in a single operation. From one to three minutes only is required to change the dies necessary in the most complicated jobs, and in every case this can be done before the metal in the furnace can be brought to the proper heat for working. The machine was designed and perfected by Martin Kennedy, foreman blacksmith.

ELECTRICAL TERMS.



(1) A sensitive receiver. (2) A multiple-contact switch.—London Elec. Times.

The obliging shopman sent
The cheap present she had meant
To look like something costly, as it ought,
But she learned to her despair
That the price mark still was there,
And we really couldn't print the things she thought.

—Philadelphia Press.

John I. Sabin, president of the Chicago Telephone Company, said: "I think the time is near when the telephone will supplant the telegraph, not only in railroading, but in many other branches of business."

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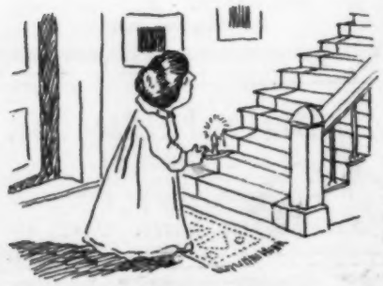
HOW THE HINDOO CLARIFIES WATER.

Alum has been used in Asia for the clarification of water from time immemorable. On the borders of the Ganges, says the Water and Gas Review, it is usual to fill large earthenware pots with water at night. A bamboo stick is split open at one end. A piece of alum is introduced in the slit and the Hindoo stirs up the water with the end that holds the alum. In the morning the water is found clear.

HE TUMBLED.



"John, slip on something and come down-stairs quick!"

John slipped on the rug.—Chicago Tribune.

WHAT EACH OF US IS WORTH.

The human body of average weight contains three pounds thirteen ounces of calcium, says the American Analyst. Calcium, at present market rates, is worth $300 an ounce, so that the amount of it contained in one human body has a money value of $18,300. Few of our fellow-citizens realize that they are worth so much intrinsically.

Beneath the spreading chestnut tree the village blacksmith stood, a-shoeing Higgin's old brown mule the best way that he could.

Beneath the spreading chestnut tree the mule, with smile divine, still stood, the while the blacksmith soared beyond the county line.

The Milaska, Japan's new battleship, which has just been built at Portsmouth, England, is said to be the most powerful war vessel afloat.

"Want" and "For Sale" Ads. 10 cents per line payable in advance. Replies may be sent to a number, care Popular Mechanics, and will be forward.d promptly without extra charge.

SPECIAL.

FOR SALE—Five sets of 1-12 h. p. electric motor castings, for $1.00 per set. Photo for stamp. Roy A. Crihfield, Lincoln, Ill.

ENGINEER'S LICENSE—Mechanics, Engineers, firemen, electricians, etc., 40 page pamphlet containing questions asked by Examing Board of Engineers; sent free. Geo. A. Zeller, Publisher, Room 592, 18 S. 4th St., St. Louis, Mo.

FOR SALE—Job lot new electrical goods given us to sell; list for stamp. We handle everything electrical and at lowest prices. Stamp for catalogue. Dept. N., T. Binford Electric Works, 904 Washington Blvd., Chicago, Ill.

HELP WANTED.

WANTED—Superintendent of Construction for quarrying and masonry, using compressed air drills, engines and heavy derricks—salary $100 per month. Only A1 men, sober and well recommended need apply. John W. Hays Co., C. E., Petersburg, Va.

WANTED—By March 1st, a good tinner and furnace man; would like a man that has some knowledge of plumbing and bicycle work. Rodney & Monk, Humeston, Ia.

WANTED—A first class salesman for the stove and house furnishing trade in Wisconsin and Minnesota. All correspondence confidential. A. J. Lindemann & Hoverson Co., Milwaukee, Wis.

CORNICE MAKER—Competent to cut on work, make drawings and estimates also competent galvanized iron stock tankmaker. Gedge Bros. Iron Roofing Company, Anderson, Ind.

SALESMEN—To introduce Williams Patent Adjustable Stove Pipe fastener. Lawrence Stamping Works, North Lawrence, N. Y.

PLUMBER AND TINNER—At once; steady work to good man. Jos Netzer, Laredo, Tex.

ASSISTANT FOREMAN in Cornice Shop, Johnston Mfg. Co., Greensboro, N. C.

EXPERIENCED MARKER AND BUNDLER wanted; lady preferred; state wages and experience; contract for one year given. Address Troy Laundry Co., Helena, Mont.

WANTED—An all around machine man experienced in wind mill and pump work. Good wages to good man. Mummert & O'Neal, Aurelia, Ia.

PATTERN MAKER who understands molding, can make drawings for house, heating and hot water boilers, and design a new boiler to put on the market—M. N. Hedges, Chattanooga, Tenn.

I HAVE A NICE SIDE LINE—Undertakers' necessity; no ten-cent job; more than expenses in it; men of high order only need apply; whole United States to work on. J. T. McKeln, Thorntown, Ind.

WANTED—First-class wind mill man for Illinois territory. Address, stating experience, Wolcott Wind Mill Co., Saginaw, W. S., Mich.

WANTED—Salesmen to handle an easy, quick seller; good commission; no competition, no sample needed. Write Hirsch Brothers, Milwaukee, Wis.

WANTED bright, first-class mechanical draftsman familiar with gasoline engine construction; one who has a knowledge of air compressors preferred. Opening for a bright, energetic man. State age, experience and salary expected. Address Compressed Air, 415 Lincoln Trust Bldg., St. Louis, Mo.

POSITIONS WANTED.

PLUMBER—First class, temperate, best of references. P. Kelly, 194 Concord street, Brooklyn, N. Y.

TINSMITH AND SHEET IRON WORKER—Can do anything in the line of roofing, range heater and furnace work. E. Burger, 1376 Third ave., New York.

SHIPPER OR TRAVELING SALESMAN—Industrious young man, understands stove range business. 47 Milford st., Brooklyn, N. Y.

MECHANICS, engineers, firemen, electricians etc., 40-page pamphlet containing questions asked by examining board of engineers; George A. Zeller, publisher, room 80, 18 South Fourth street, St. Louis.

SALESMAN for farm implements, Michigan preferred territory; years of experience; references gilt edged. Address box 75, Grand Junction, Mich.

TINNER—Understands plumbing and furnace work, have had experience in hardware and furniture business, speaks four languages. Lawrence Marchetti, Weston, Pa.

HOUSEKEEPER OR COMPANION—Woman with one child. References. P. O. Box 76, Hamilton, Ia.

IMPLEMENT AND VEHICLE SALESMAN—12 years' experience, Barnum, 295 Lincoln ave., Chicago, Ill.

SALESMAN—In any line of metal work, thorough knowledge of manufacturing, 117-119 South Fourth street, Philadelphia, Penn.

SALESMAN—For steam, hot water and hot air heaters; wide acquaintance with New England trade. "S. and H. W.," 70 Kilby street, Boston, Mass.

BOOKBINDER—Forwarder or finisher, or foreman, in small city of Illinois preferred. Lock Box 284, Matttoon, Ill.

LAUNDRY MANAGER—Up to date, West preferred. Address Manager Dalton Steam Laundry, Dalton, Ga.

WANTED—Side line; for my men to handle on commission; I have men traveling all over the state. O. A. Rudolph, Canton, S. D.

BUSINESS CHANCES.

FOR RENT—Fine store for hardware business. S. Scott, White Plains, N. Y.

FOR SALE—Paying tin business; reasons: poor health. Address 710 Maryland av., Butte, Mont.

PARTNER to manufacture new patented hydraulic ram of great merit; J. M. Kline, Beavertown, Pa.

WANTED—Farm machines of all kinds to manufacture cheap. All work guaranteed. Small orders as well as large ones given special attention. Address Livingston Agricultural Foundry & Machine Works, Albia, Ia.

WANTED—One 12 to 20-h. p. vertical boiler and engine for laundry, one 100-shirt washer; one 20 to 40-inch centrifugal wringer; one high board combined ironer; one blower and gas machine; shafting, hangers, pulleys, belts, etc.; must be new or nearly so; good and a bargain. Address Box 265, Siloam Springs, Ark.

FOR SALE—One blacksmith shop, wagon shop, paint shop, barn, shed and dwelling unexcelled for pump and farm machinery business. Cheap. Address P. W. Peters, Woodland, Wis.

WANTED—Second hand, first class, plain Corliss engine, about 18x36. State make, condition, length service, delivery, price. E. D. Willis, Box 419, Aurora, Ill.

FOR SALE—Wagon shop, fully equipped with all necessary machinery, in one of the best towns in Iowa. For particulars write to Lock Box 21, Waukon, Ia.

WANTED—To buy a good paying hardware business, from $2,000 to $3,500. In town of from 500 or more inhabitants, with good territory. Enclose stamped envelope for reply. Address B. A. H., Rockwell City, Ia.

FOR SALE—One beading machine with stand, takes No. 10 work, and 1 pair No. 2 O. G. Rollers, good as new, has not done 10 days work. Address C. F. Link, Frankersmith, Mich.

DEVICE FOR HOLDING A PLUMB BOB LINE.

A correspondent from Victoria, B. C., illustrates in the Engineering News, a device used by him for 30 years, by which the plumb bob line may be easily lengthened or shortened. The slide is of bone or hard wood about 2½ inches long, ¼ inch wide and 1-16 inch thick.